

## PATHOLOGY SECTION

### Hardwood Disease Problems

Actinopelte leaf spot, Actinopelte dryina, incidence was light to moderate in Kanawha County. Only a few specimens of oak foliage displaying disease symptoms were submitted to the Pest Identification Laboratory this summer.

Anthracnose of dogwood, Discula sp., was reported in West Virginia for the very first time during the summer of 1985. The confirmed report was from the Morgantown area. Diseased trees have also been observed in Jefferson, Kanawha and Greenbrier Counties. Both ornamental and forest trees have been killed by this disease in the Northeast. Initial symptoms include small, purple-rimmed spots and large brown blotches on the leaves. Twig and branch dieback usually follows. Drought and nutrient deficiency generally contribute to the problem.

Anthracnose disease of other hardwoods, Gnomonia sp., Gloeosporium sp., Guignardia sp., etc. caused few problems this year. Symptoms were very light on sycamore trees while symptoms were light to moderate on white oak during 1985. The low rate of disease incidence can be attributed to the lack of proper environmental conditions. We didn't experience cool, moist conditions at bud break. Cool, moist conditions are required for infection and disease development. Disease incidence during 1985 equaled that reported in 1984.

Apple scab, Venturia inaequalis, incidence was light to moderate during 1985 on apples and crabapples. There was a dramatic decrease in disease incidence from that reported in 1984.

Bacterial canker of oak results from a bacterial infection of the outer xylem, cambium and phloem of the host tree. Diseased trees develop a fluxing condition. Disease incidence has appeared to decrease dramatically from 1984 to 1985. Mild winter conditions during the winter of 1984-85 may be responsible for the decrease in disease incidence. Severe winter conditions sometimes damage the cambium layer on trees resulting in frost cracks and wounds where other infections can occur. Isolations from the canker area have yielded several genera of bacteria including a Corynebacterium sp., and what appears to be an Erwinia sp. The Erwinia sp. is most likely responsible for the fluxing condition.

Beech bark disease complex, Nectria coccinea, Nectria galligena and Cryptococcus fagisuga, occurs over 70,000 acres of forest land located in Randolph and Pocahontas Counties primarily. Beech mortality due to this disease has increased dramatically.

Bullseye leaf spot, Cristulariella pyramidelis, incidence was light to moderate during 1985 on maples and other hardwoods. Drought conditions from mid-summer on were not conducive to infection and disease development.

Cytospora canker of cherry, Cytospora leucostroma, was observed for the very first time in West Virginia during the summer of 1985. A cooperative survey with the USFS S&PF was conducted during 1985, detected this disease in 8 West Virginia Counties including: Barbour, Grant, Mineral, Monongalia, Preston, Randolph, Tucker and Webster. Cytospora canker of cherry is

characterized by twig cankers, branch mortality and gummosis. The foliage on effected branches appears a bright reddish-brown in July and early August.

Dutch elm disease, Ceratocystis ulmi, incidence throughout the state was high again this year. Dutch elm disease is probably the single most important forest and shade tree problem in the state.

Elm phloem necrosis, Elm, yellows, MLO, continues to occur in native elm populations along U.S. Route 21 near Charleston, West Virginia. Samples of diseased trees were submitted to Dr. John Castello at the University of Syracuse. Dr. Castello employed a biochemical assay to confirm the presence of the phloem necrosis MLO in the elm tissue.

Fusarium canker, Fusarium solani, of yellow poplar continues to occur in a yellow poplar superior tree seed orchard in Mason County. Recent research conducted at West Virginia University indicates that damage to the seed orchard initially attributed to the fungus Fusarium solani may actually be secondary to damage caused by the root collar borer insect, Euzophora ostricullerella.

Maple decline, a stress related disease syndrome, appears to be occurring with increasing regularity. This disease problem has been reported in urban trees as well as trees in orchards used by the sugar maple industry. During the past 3 summers, drought conditions have apparently contributed to the problem.

Nectria canker, Nectria galligena, is one of the most common canker diseases on West Virginia hardwood trees. Walnut, birch, sassafras and maple are all highly susceptible to this problem. Site conditions contribute to disease incidence. Walnut trees should only be planted on well drained, fertile sites.

Oak decline, a stress related disease has been reported in oak stands in various sections of the state. Drought and defoliation are frequently considered the primary predisposing factors. Secondary agents associated with oak mortality include the root rot pathogen, Armillaria mellea and the two-lined chestnut borer, Agrilus bilineatus.

Slime flux, Erwinia nimipressuralis, is caused by a bacterial infection in hardwood trees. Unlike bacterial canker, where the infection is contained in the outer xylem and cambium, slime flux infections occur in the heartwood of trees. Infections are observed most commonly on elm trees. However, other hardwood trees including maples and oaks are also susceptible.

#### CONIFER DISEASE PROBLEMS

Armillaria root rot, Armillaria mellea, is sometimes observed causing mortality in conifer stands. During the past year, this disease was reported in one white pine stand causing extensive tree mortality.

Atropellis canker, Atropellis tingens, is a disease problem of hard pines (Scotch pine and Austrian pine) planted on poor sites. To date, no main stem cankers have been observed. All the cankers have been restricted to the smaller branches where branch tip mortality results.

Cytospora canker, Cytospora kunzei, is a serious problem on Norway and Colorado blue spruce statewide. Disease development is thought to be effected by environmental factors such as moisture stress. As a rule the disease develops first on branches closest to the groundline. The disease then progresses up the tree to higher branches. Mainstem cankers sometimes develop on Norway spruce.

Diplodia tip blight, Diplodia pini, is occasionally observed in Christmas tree plantings on hard pines but is typically observed on mature trees employed in wind breaks or used as ornamentals. Austrian, Scotch, red, pitch and table mountain pines are all susceptible.

Fraser fir branch mortality, Botrytis sp., was first observed in a Fraser fir stand in Randolph County in 1984. During May of 1985 the same stand was resurveyed to determine the severity of the problem. Disease incidence was greatly reduced over 1984. Apparently, the predisposing factors present during the spring of 1984, such as frost or hail, were not present at bud break and shoot extension during 1985.

Lophodermium needlecast, Lophodermium pinastri, disease incidence was very low during 1985. Moderate defoliation was reported in a single Greenbrier County Christmas tree stand. In addition, a Christmas tree grower in Hampshire County reported purchasing diseased seedlings from a nursery in Pennsylvania. Examination of the seedlings revealed that they were infected with the conidiomata stage (Leptostroma) of Lophodermium pinastri. Approximately 70% of the 1,000 Spanish strain 3-0 seedlings he purchased were diseased. Spray recommendations were provided to the landowner.

Naemacyclus needlecast, Naemacyclus minor = Cyclaneusma minor, disease incidence was very low during 1985. However, during years when the environmental conditions are perfect, it is hard to find a Scotch pine planting without a few diseased trees. Diamond Shamrock Chemical Company is presently trying to register the fungicide Bravo 500 with the EPA for use against Naemocyclus needlecast.

Pine root decline, Verticiladiella procera, continues to be a problem in many of our white pine plantations. Disease incidence remains fairly constant in most stands with annual losses not exceeding 5% per year. This disease was observed in a new Randolph County plantation near Beverly during 1985.

Pinewood nematode, Bursaphelenchus xylophilus, has been detected in 13 West Virginia counties. The nematode was isolated from a Japanese larch in Hampshire County during 1985. To date, in West Virginia, the pinewood nematode has been isolated from Austrian, Scotch, white, red and Pinastri pine as well as a Japanese larch tree.

Rhizosphaera needlecast, Rhizosphaera kalkhoffi, appears to be on the increase in West Virginia. Each year increasing numbers of spruce branch specimens are submitted to the Pest Identification Laboratory. One 3 acre Norway spruce Christmas tree plantation in Greenbrier County was observed suffering extensive needlecast problems due to this disease.

Red spruce decline has been observed in the high mountain regions for a number of years. Factors such as Cytospora canker, reduction in mycorrhizae

infections on the roots, insect infestations and acid rain may all contribute to the decline problem. The spruce decline problem is not a simple easily solved problem. There is a myriad of inter-related factors that contribute to the syndrome.

Swiss needlecast, Phaecocryptopus gaumanni, has been observed in Douglas-fir Christmas tree plantations located in 7 different counties. Diseased trees appear chlorotic and thin. Therefore, they are rendered unsalable.

#### ABIOTIC FACTORS

Air pollution damage was low again during 1985. Oxidant pollution damage was evident only on scattered white pine trees throughout the state. Very few inquiries or specimens concerning this problem were submitted to the Pest Identification Laboratory this year.

Serious drought conditions were reported in the western portion of West Virginia for the third consecutive summer. The drought of 1985 was one of the most severe on record. Decline problems attributed to drought have been reported on both hardwood and conifer stands. Even hard pines, known to be drought tolerant, have developed problems. In Preston County a dramatic needle tip burn problem was attributed to the drought as was oak mortality in Mercer County.

Herbicide damage resulting from the misapplication of herbicides near desirable trees and shrubs continues to be a problem. In addition, we have investigated a number of cases of vandalism involving herbicides.

Squirrel damage was observed on Scotch pine in a mixed conifer stand containing Scotch, Virginia and white pine trees. The red squirrels peeled the bark on the trees in oval patches in the upper crown. Apparently, when high squirrel populations develop, the inner bark of some conifers is utilized as a food source. Similar damage has been observed on red pine at higher elevations in the state and on sugar maple trees on the State Capitol grounds.

#### PROJECTS

##### White Pine Blister Rust

This year 53,920 acres of land were surveyed for Ribes bushes and diseased pine. Suppression work was conducted on 3,207 acres with 15,673 Ribes plants destroyed.

A total area of 414,906 acres of state and private land now falls within the control areas. White pine occurs on 224,934 acres of control area land. The National Forest control zone encompasses 144,503 acres with white pine on 86,902 acres.

##### Oak Wilt Detection

During the summer of 1985, 16 high oak wilt disease incidence quadrangles in the eastern panhandle and 20 high disease incidence quadrangles in the southwestern portion of West Virginia were flown to determine oak wilt disease

incidence. Disease incidence fluctuates annually in each section of the state. Fortunately, there has been no overall trend towards an increase in disease incidence. In addition to the 36 quadrangles mentioned above, the following low or no disease incidence counties were flown: Barbour, Brooke, Harrison, Marion, Monongalia, Nicholas, Ohio, Pocahontas, Preston, Randolph, Taylor, Tucker, Webster and Upshur. Two suspect trees were spotted and subsequently sampled in Monongalia County. The oak wilt fungus was isolated from bole samples obtained from a symptomatic tree near Blacksville. Samples obtained from a tree near Pioneer Rocks proved negative. Four counties in West Virginia presently remain oak wilt free. These counties include: Brooke, Ohio, Tucker and Webster.